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vary from three to four, five, and six. I may add that five-lobed corollas are common, and these are usually accompanied by five anthers.

The number of male plants is about equal to the female; occasionally plants of the separate sexes intermix. I, and probably others, have often noticed in the fall some patches bearing abundantly, other patches without a berry. The facts I now offer afford the solution.

In reference to *Mitchella*, it may not be out of place to correct an error in Lindley's "Vegetable Kingdom." The learned author includes in his natural order Cinchonaceæ *Mitchella*, *Cephalanthus*, *Diodia*, *Oldenlandia* and *Spermacoce*, —all high northern plants; and yet, when speaking of the geography of the order, writes that "the most northern species in America is *Pinckneya pubens*, inhabiting the Southern States of North America."

Second contribution to the History of the Vertebrata of the Miocene period of the United States.

BY E. D. COPE.

A visit to the Miocene region of the western shore of Maryland, has explained to the writer more clearly the stratigraphical position of the vertebrate fossils described in this and preceding essays on the subject.

The miocene deposit which contains the fossils, consists of a dark sandy clay, varying from a leaden to a blackish color, through which water does not penetrate. Its upper horizon may be traced along the high shores and cliffs of the Chesapeake by the line of trickling springs which follow its upper surface. The bottom I have not seen, and cannot give its depth, but a great bed of shells occurs at from fourteen to twenty-two feet below its upper horizon. This consists of, first, two separate shallow strata of shells, and about four feet below the upper, a heavy bed at the depth mentioned. The lesser beds vary in amount, being sometimes wanting.

The streams of the country either flow on or cut the shell beds, and display their washings, as teeth of sharks, cetaceans, etc. The bones generally occur at or near the level of the upper line of shells. The remains of the large whale, the Eschrichtius cephalus mihi, lay across the bed of a small run and penetrate the bank, where I saw the remainder of its vomer, of which I have the half; with numerous other parts of the cranium added since the description of the species, it was dug out by my energetic friend Jas T. Thomas, whose evidence as to the pertinence of the various pieces described to the same animal is conclusive. It is, if need be, confirmed by the white color and porous texture of them all, a character not noticeable in other large whale remains procured by him. Apparently pertaining to a genus known as fossil only from the European drift, it becomes important to be sure of its Miocene origin. This must be admitted; it lay together as originally deposited, just below the upper shell line, and did not extend so far down as the great bed, from 10 to 18 feet below the top of the blue loam. The upper line of the latter has been varied, inland, by the various operations of erosion, etc. In some places it forms the bottom of vallies, which are excavated almost to the shell line. In such a situation, about 3½ feet above the great shell bed, and a few inches below the surface on the side of a creek, the bones of Galera and Dicotyles occurred.

BASILOSAURIDÆ.

CETOPHIS Cope.

This genus rests upon the evidence furnished by caudal vertebræ in the collection. They present an approximation to Basilosaurus in the great thickness of their epiphyses. In the more elongate vertebra each epiphysis will measure the third the length of the centrum deprived of them; in the less elongate, they measure one-half the same; in the shortest, more than half the remaining centrum. One extremity of the vertebra is flat, the other strongly convex, and none have any trace of diapophyses. The neural arches have been partly broken away, but have been similar to those of other genera, while the groove that marks the inferior aspect of caudal vertebræ is normal. In two vertebræ, the longest and shortest, the foramina which usually pierce the sides of the centra vertically, issue below, within the basal groove and above, below and outside the basis of the neurapophysis. In another specimen the foramen opens outside the inferior sulcus, and in one there is no foramen at all. These structural features indicate a genus of general peculiarity, and perhaps allied to Basilosaurus. There may be some question as to whether two species are not represented among the vertebræ.

CETOPHIS HETEROCLITUS Cope.

The four specimens may represent a proximal, a median, and a distal caudal of one individual, and a median caudal of another. They were not adult, as the epiphyses are entirely separable. The longer or proximal caudal is subhexagonal in section, the median depressed, and the smallest round in section. The larger median is nearly round in section. The epiphysis instead of retreating before a process of the centrum opposite the four apophyses, as in Ixacanthus, advances on the centrum at these points. The inferior groove of the centrum is deep on the first and shallower on the succeeding; obsolete on the last. The neural canal about as large on the proximal as in anterior caudals generally.

	In.	Lin.
Length longest	3	3·8
Height flat articular face	2	1
Width do. do.	1	11·
Length median (smaller)	2	6.3
" without epiphyses	1	1·5
Height flat face	1	9
Width "	1	9·2
Length median (larger)	3	1·2
Width flat face	2	5
Length smallest	2	1
" without epiphyses		11·
Height flat extremity	1	10·5
Width do. do.	1	11·

From Charles county, Maryland. From Jas. T. Thomas, Mus. Academy.

The convex articulation of the vertebræ would suggest a greater flexibility of the column in this part than is usual among Cetacea, but more as in cervical vertebræ of long-necked mammals, and in reptiles. The absence of diapophyses would confirm such an indication. Were it not for the inferior groove the longer vertebræ above described might be taken for a lumbar, and it may be such, as in the Zarhachis flagellator a similar form coexists with the usual form of diapophysis of that part of the column. There is probably some distant affinity between the two genera.

With respect to the genus Basilosaurus, it may be noted that the *Polyptychodon interruptus* of Emmons, must be regarded as established on one of its canines. Whether the species be the D. cetoides must be left for their examination. A fine specimen is in the Museum of the Mount Holly Lyceum of Natural History.

In the description of the Cynorca proterva (in Proceed. Acad. 1867,) misled by the extraordinary resemblance to Giebel's plate quoted, I unfortunately mingled with its molar and premolar teeth, the canine of small Dicotyles. This point, suggested to me by Leidy, I have no doubt is the case. It will be necessary therefore to add the following details of character of the characteristic molar and premolar, which I described too briefly (p. 151): "Molar with two roots. Premolars with short conic crowns. Premolars compressed, cutting. Roots of premolars compressed." (P. 152): "Two teeth having crowns similarly though rather more symmetrically formed, I suspect to have occupied that position," i. e. "between molars and premolars."

The premolar first mentioned is about ·8 in length, the crown slightly striate. The anterior molar has two roots, which are united some distance below the crown. The crown exhibits no denticles, and is not more elevated than the antero-posterior diameter of its base. This tooth, as well as the other, is of small size, and indicates the smallest species of the family.

The Pontogeneus priscus Leidy, which I referred, in accordance with a printed suggestion of Leidy's, to the *Zeuglodon pygmæus* Müller, on examination proves to be a Delphinoid. The species of Müller is not only generically distinct from Basilosaurus, but from Doryodon also, to which I referred it,* if it be regarded as established on the cranium figured by Gibbes in the Journal of the Academy.

DELPHINIDÆ.

Among the vertebræ of the species of this family collected by Jas. H. Thomas in the Miocene marls of Charles county, Maryland, may be recognized those of five genera, as follows:

The caudal vertebræ broader than long; lumbars, sacrals and caudals nearly similar; diapophyses of lumbars and caudals flat dilated, the latter with vertical foramen..DELPHINUS.

The caudals longer than broad, slender; diapophyses broad, of caudals perforate...DELPHINAPTERUS.

The caudal vertebræ longer than broad, lumbars and caudals with flat diapophyses which are not perforate..ZARHACHIS.

The lumbars, dorsals, and caudals elongate, narrower than long; the diapophyses of some of the lumbars and of the caudals narrow and spinous, and not perforate; epiphysial face plane.............................PRISCODELPHINUS.

The lumbars and dorsals shorter, the diapophyses of both posterior lumbars and caudals narrow and subcylindric, not perforate; epiphysial face grasping the epiphysis by four processes, one opposite each neur- and one opposite each diapophysis...IXACANTHUS.

We find a serial relation among the Dolphins of this period, and exemplified in the characters of the above genera. In Tretosphys the diapophyses are all flat as in Dolphins, generally many of the caudals perforate, with a vertical foramen at the base as in them. This is succeeded by a genus in which the blood vessel which in the former passes through this foramen runs round the front of the base of the diapophysis. In the next form some of those of the caudal vertebræ are narrower, and the posterior subcylindric and spine-like; in the last genus of the series the diapophyses of all the caudals and many of the lumbars have the same spinous form. There is also a relation of a similar kind in the forms of the beak of Miocene Dolphins. All are elongate, some very narrow and prolonged, and some a cylindric beak only toothed at the base, (Rhabdosteus Cope). It is an interesting object of inquiry to determine whether the relation of structure of the processes in any way coincides with that seen in the muzzle.

A point to be noticed in our Miocene Dolphins, as compared with the Inia, Beluga, Delphinus and Phocæna of the present period, is the universally increased length of the vertebræ of the posterior part of the vertebral column. Those species named here Delphinapterus resemble in their dorsal vertebræ the Belugas, but the caudals of some, instead of being shortened, as in the latter, do not diminish in length. This points to a more slender form, and with the narrowed diapophyses and increasing thickness of the epiphyses constitutes an approach to the Basilosaurus type.

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* Proc. Acad. 1867, 155.

IXACANTHUS Cope.

This genus is similar to the next in the cylindric spinous character of the diapophyses af the caudal and lumbosacral vertebræ, but differs from it and all other Delphinidæ with which I am acquainted in the manner of attachment of the epiphyses of the vertebræ. Instead of being nearly plane and thin discs, they are furnished with two oblique faces above, which are capped by a projecting roof formed by the floor of the neural canal, while their central portion forms a knob which fits a corresponding shallow pit of the centrum.

IXACANTHUS CŒLOSPONDYLUS Cope.

Extremities of centra deeply concave when epiphyses are removed; length of vertebræ less than breadth.

	In.	Lin.
Length centrum lumbar	2	4·5
Width " "	2	6·5
Elevation " "	2	4
Width neural canal on dorsal	1	
" " " on lumbar		4½
Length of caudal vert	2	6
Transverse diameter	2	3
Width diapophysis at base		6
Lumbar,—elevation of body and spine to anterior zygapophysis	4	9½

We have of this species three dorsals, nine lumbo-sacrals and one caudal, one only of the lumbo-sacrals exhibits the spine-like diapophysis characteristic of the genus. One of the caudals belongs to an entirely adult animal. The dorsals are rather constricted, and rounded below; the lumbo-sacrals have a strong median keel, except in one near the canal series, when it again becomes rounded below.

I first received this species from my kind friend Oliver Norris Bryan, of Charles county, Md. Jas. T. Thoms has also discovered various portions of it.

PRISCODELPHINUS Leidy.

Posterior lumbars and caudals spinous, dorsals with flat diapophyses.

The prominent character of the genus is seen in the lumbo-sacral and caudal vertebræ, whose diapophyses are very narrow at the base, and soon become cylindrical and slender, terminating in an obtuse point. The general form of the vertebræ is like those of Delphinus, but with the exception above noted, that the caudal vertebræ, instead of being shorter than the dorsals, are really longer, till we approach the posterior portions of the series. The largest of the typical species will not exceed seven feet in length, while the aberrant P. flagellator has been perhaps twelve.

In the P. spinosus Cope, the spinous form of the diapophyses is exhibited among the longer ones of the lumbar series considerably in advance of the caudals. In P. atropius Cope, and P. conradi Leidy, I have seen it on the most posterior lumbars only, though it may occur further anteriorly, and several such have the diapophyses much narrowed. I have not seen it in the P. harlani Leidy, but it probably exists there, as the species is very near the P. conradi.

PRISCODELPHINUS SPINOSUS Cope.

This species is represented by two cervical, three dorsal and eight lumbo-sacral vertebræ; they are about as broad as long, with articular faces transversely oval. As they belong to more than one individual they vary a little more than is to be expected in a single series. They differ of course greatly in the size of the neural canal, with the position in the column. That with the smallest, (the posterior) exhibits no zygapophyses or their rudiments. General form depressed; sides of centrum nearly plane to a well-marked obtuse median keel.

		In.	Lin.
Length centrum lumbar		1	9
Width articular face		1	7·5
Height		1	6
Length diapophysis		2	
Width neural canal	posterior lumbar.		3
Whole height of		3	8
Length diapophysis of		1	6·5

This is the type of genus, for in it the peculiar form of the diapophyses extends much further forward on the series of vertebræ than in any other.

PRISCODELPHINUS ATROPIUS Cope.

This species is based upon three cervicals, and three dorsals of one, two lumbars and one caudal of a second individual, one lumbar and one caudal of another, and three lumbars of a fourth. The diapophysis of the caudal is short and spine-like, as in the last genus, and the last lumbar has had a nearly similar process. The centra of all are very slightly depressed and constricted medially. The dorsals are broadly rounded in section without inferior carina; on the last lumbar the lateral face below becomes, as in other species, slightly concave.

This species differs from the P. harlani in that the dorsal vertebræ are not so depressed, are stouter, and have not the median inferior keel seen in it.

	In.	Lin.
Length of a dorsal (No. 1)	2	2
Width articular face	1	11·5
Depth " "	1	7
Height neural canal (No. 2)		9·7
Length diapophysis (No. 1)	1	4

PRISCODELPHINUS HARLANI Leidy.

Proceed. Acad. 1851, 327.

A few vertebræ of this species occur in the collection.

PRISCODELPHINUS CONRADI Cope.

Delphinus conradi Leidy, Proc. Academy, 1853, 35, Cope, l. c. 1867, 144.

This appears to be an abundant species of our Miocene beds. We have ten lumbars and one caudal vertebræ. Its affinities are apparently nearer the last-mentioned species than any other.

PRISCODELPHINUS STENUS Cope.

This species is represented by two vertebræ, but quite characteristic ones of the lumbar series. They indicate both the smallest and the most slender species of the genus. A section of the vertebra would have an almost exact pentagonal form, though the articular surfaces are subround, and, what occurs in no other species, a little deeper than wide. The neural arch preserved is elevated and possesses a weak pair of zygapophyses. The bases of the broken diapophyses indicate that they are very wide. The lower face of the centrum has a strong median longitudinal angle, stronger than in any species, and not prolonged into a thin keel as in D. hawkinsii. The planes of the centrum are mostly straight.

	In.	Lin.
Length centrum	1	7·2
Height	1	0·5
Width	1	0·5
" neural canal		5·8
" basis diapophysis		10
Height neural canal		6
" zygapophysis		8·2

ZARHACHIS Cope.

This genus is established on vertebræ which bear a general resemblance to those of Priscodelphinus, but differ in the essential point of having flat and broad diapophyses of the caudals. It is therefore intermediate between that genus and Delphinapterus. The posterior of the caudals in our museum exhibits a narrowing of the diapophyses, as certain of the lumbars do in Priscodelphinus.

Zarhachis flagellator Cope.

This species is represented by only two lumbar and two caudal vertebræ, which belonged to at least three different individuals, none of them adult. Neither is any one entirely perfect, but they indicate a very distinct species, by clear characteristics. All these vertebræ are of greater length as compared to the diameter than in any other cetacean known by me except the great Basilosaurus. The lumbars, when compared with those of T. lacertosus, differ in their broadly obtuse median line, which offers distinct trace of the two keels. An anterior caudal either exhibits unusually broad diapophyses, which are directed downwards, or else is a lumbar with two keels, and a median groove below, which is not seen in any other species. The caudals exceed in length those of any other species. One of these, from a large individual, resembles that of P. atropius in the narrow basis of the diapophysis, which is probably narrow, and not perforate. The length of the vertebræ is nearly double the vertical depth of the articular faces. The diapophysis is nearly median; the basis of each neurapophysis is one-half the length of the centrum, and median.

	In.	Lin.
Length lumbar (epiphyses hypothetical)	3	6·5
Depth	2	2
Width	2	3
" neural canal	2	8
Length caudal (one epiphysis supplied)	3	10·5
Depth "	2	4
Distance between inferior keels		10·5
Width basis diapophysis		10·5

DELPHINAPTERUS Less.

Delphinapterus ruschenbergeri Cope.

This species is represented by two vertebræ, a lumbar and a caudal, which indicate an animal of about the same or a little larger size than the Priscodelphinus stenus. They are also of a slender form, more so than in any species of the last genus. What distinguishes it generically, is that instead of the slender diapophyses of the caudal it has the broad ones of the true Dolphins, though broader even than is usual in these, and it is perforated a little on one side of the middle by the foramen seen among Whales and Dolphins generally.

Articular faces transverse oval; centrum slightly constricted with an obtuse keel along the median line. The two inferior keels of the caudal vanish on part of the middle of the centrum.

	In.	Lin.
Length centrum	1	9
Height "		10·3
Width "		12·5
" neural canal		5·2
" basis diapophysis lumbar		10·5
" " " caudal		10·

A dorsal vertebra which relates in age and size with the preceding, is more than usually constricted lateromedially, the inferior line concave, and slightly keeled; length 16½ l., width 12·5 l.

This species is dedicated to W. S. W. Ruschenberger, M. D., of this city, an active member of the Academy, and author of introductory works on Natural History.

DELPHINAPTERUS LACERTOSUS Cope.

This is much the largest species of the genus. It is based on two lumbar vertebræ which have been united by an exostosis and then separated. They are quite elongate and have broad diapophyses so far as their bases indicate. The articular surfaces are about as broad as deep, and slightly pentagonal in outline, not ovoid or discoid as in other species. The lower surface presents an obtuse median angle, with slightly concave sides. The general proportions can be derived from the measurements.

	In.	Lin.
Length centrum	3	5·5
Heighth articular surface	2	2·5
Width " "	2	4·5
" neural canal		7·5
" base diapophysis	1	9

In addition to the above, there are in the Museum of the Academy specimens of dorsal lumbar and caudal vertebræ of this species from the Miocene of Cumberland county, New Jersey. They all belong to one individual and represent the characters of the species well. The lumbars are all strongly keeled below, and the dorsals narrowly rounded, and slightly concave on each side. One posterior caudal, with rudimental anterior zygapophyses exhibits rather short diapophyses pierced by the vertical foramen. I therefore refer this species to Tretosphys with the remark, that it is not so typical as the first mentioned species, where the perforation is at the middle of a broad, well developed transverse process.

The two species which follow are assigned to this genus, only on account of their resemblance to the present one, as I have not seen the caudal vertebræ of either. They may be thought to rest on but a slight basis—but as they are extremely easily distinguished among several bushels of bones of other species, I feel entire confidence in their reliability.

DELPHINAPTERUS TYRANNUS Cope.

This is a large species, doubtfully of the genus, not uncommon in the Miocene formations of Maryland. It is represented in the collection by one dorsal and three lumbars. Three of these serve as the type of our diagnosis. They are much shorter in relation to their other dimensions than those of any other fossil dolphin herein described, except the Ixacanthi, and they have the broad diapophyses of the genus Delphinus. The epiphyses are unfortunately lost, and but three of the specimens belong to the same individual. Articular surfaces broader than high, lateral faces concave everywhere and in every direction; below they meet in an obtuse concave ridge.

	In.	Lin.
Length centrum lumbar (epiphyses supplied)	3	
Depth "	2	10·5
Width "	2	3·2
" neural canal		6·7
" basis diapophyses	2	0·5
Length lumbar of larger individual		

The rugosity of the epiphysial surfaces is less marked and more intrerupted, *i. e.* without radiating ridges, than in any other species.

DELPHINAPTERUS HAWKINSII Cope.

This species is based on two lumbar veterbræ, which resemble those of P. conradi, (*Delphinus conradi* Leidy), but are of much larger size and are furnished with a strong and acute keel below on the median line, as is seen in no other species. The diapophyses are very wide at the base; centrum much depressed. Both these specimens are young and have lost their epiphyses; with the latter, they would be relatively as slender as those of D. lacertosus; they differ from the latter in their deep keel, like that of a boat.

A dorsal vertebra is with much probability referred to the same species. It is therefore a little shorter than the lumbars and has not so strong a keel; yet the latter is more marked than in any other species, contrasting much with the round face of the D. lacertosus. It is adult with fixed epiphyses; the articular faces are subround. The upper part of the diapophyses come from the base of the neural arch, and the neural canal is wide, with median ridge as usual.

	In.	Lin.
Length, dorsal, centrum	2	11·5
Depth articular face	2	0·5
Width of " "	2	2·5
" " centrum at base transverse margin of diapophysis	2	10·3
Length centrum lumbar	3	6
Width in front diapophysis	2	5·2
" of "	1	10·5
Depth centrum from canal to edge of keel	1	10·5

This species is named for my friend B. Waterhouse Hawkins, the restorer of the extinct mammals and reptiles at Sydenham Palace, England, who is now engaged in the Museum of the Academy on a similar work for the Central Park, New York.

DELPHINAPTERUS GABBII Cope.

This species is indicated by a well preserved caudal vertebra of an adult, which is so different from anything else in our Museum as to require notice. It has pertained to a species of not more than half the length of the T. grandaevus, and is less strongly constricted everywhere and especially below. In a caudal of near the same position, the ridges and chevron articular surfaces are much more elevated, especially those on the anterior part of the centrum. They embrace a very deep groove in this, a shallow one in the T. gabbii. An additional longitudinal ridge on each side the inferiors in front is wanting in T. gabbii. Both have a delicate one above the diapophyses in front, the T. grandaevus behind also. There is no posterior zygapophysis in the T. gabbii; the caudal of the latter is also relatively shorter.

	In.	Lin.
Length centrum	2	
Depth articular face anterior	1	5·7
Width " " "	1	7

This species is dedicated to my friend Wm. M. Gabb, Palæontologist of the State Geological Survey of California.

To this genus belongs also the Priscodelphinus grandaevus of Leidy. This species is not rare in our collections.

I may add that there still remain species of Delphinidæ in the collection which are as yet undescribed.

BALÆNIDÆ.

The vertebræ of several rather small species of this family were procured by J. T. Thomas, of which a few are sufficiently characteristic for description. They are accompanied by the other bones of the body, but as these must be allocated with much care and labor, and as the vertebræ are most abundant and therefore characteristic of the beds, I think best to describe them from these.

ESCHRICHTIUS Gray.

ESCHRICHTIUS PUSILLUS Cope.

This species is indicated by many vertebræ, of which one dorsal, six of the lumbars, and one caudal may serve as types. They indicate a species of less size than any heretofore described, except perhaps the B. rostrata now living. They are about half the size of the vertebræ of Balænoptera prisca and B. palæatlantica, and 3-5ths those of Eschrichtius cephalus.

The dorsal is a little longer than transverse width of centrum, and 2-5ths longer than vertical width of the same; the latter is therefore a depressed oval. Inferior surface a regular arch from side to side. The lumbars have the usual median keel, and the articular faces are not quite so transverse; the external planes are generally concave. The venous foramina in these are so small as not to be noticeable.

The articular faces of the caudal are a little more compressed and nearly as deep as wide. The two inferior keels are very slight, the diapophysis are not perforate, and the neural arch stands on 3-5ths length of the centrum.

	In.	Lin.
Length dorsal	4	11
Height articular face	3	6·2
Width " "	4	3
Width neural canal	1	4
Lumbar length	4	11
Height articular surface	3	11
Width " "	4	2
" neural canal		10
Caudal, length	4	
Height articular surface	3	9 5
" to zygapophyses	5	2
Width articular surfaces	4	

Several cervical vertebræ show the characters of the genus and species. They are all distinct, and their parapophyses and diapophyses have not probably been united, as the portions of them remaining are quite slender.

The superficial dense bony layer of the ramus of the mandible, of which we have specimens, is well developed, and nowhere fissured, and the nutritious foramina small. The ramus moderately convex on both faces, much as in the Balænoptera prisca, (*Balæna* Leidy), and like it, the nutritious foramina were arranged in a series on each side of and close to the median superior ridge. What distinguishes it from the latter is the presence of a distinct median ridge, which separated from the inner face of the ramus by a strong longitudinal groove. The nutritious foramina of the inner side penetrate along the line of this groove. The size is about one-third the same portion of the jaw of the B. prisca. Like the latter its inferior margin is greatly decurved, and the outer side more convex than the inner.

	In.	Lin.
Length of fragment	15	
Depth inner face	2	
Circumference	5	2·5

Remains of the mandibles of this species are not uncommon in the Miocene region in the beds of streams. I have in similar situations dug out the vomers of two whales whose size would correspond with the present. Bullæ of the periotic bones of small Balænidæ are not uncommon in the same beds, and I suspect are mostly to be referred to this and the succeeding species.

The species appears to occur in the phosphatic deposit of the neighborhood of Charleston, South Carolina, as I have a specimen of a lumbosacral vertebræ from that locality. It was among the toothless whales what the small elephant of Malta was to the giant elephants. Our specimens have belonged to individuals of not more than fifteen feet in length, and probably adult.

MEGAPTERA Gray.

Megaptera expansa Cope.

This species is based on numerous vertebræ from the Thomas collection, several from the Nomini Cliffs, Westmoreland county, Virginia, presented to the Academy by my friend Oliver N. Bryan, of Charles county, Md., and by some in the Academy's Museum from Virginia.

The cervicals have a greater antero-posterior diameter than those of the Eschrichtius species, but show quite similar di- and parapophyses. They are, however, not at present in my possession, and their full description must be postponed for a time.

There are also ten dorsals and several lumbars and probably some cervicals from the same collection. The former have a broad and capacious neural canal, and the diapophysis is given off in all from the neural arch. In the lumbars this process is of course given off lower down, but in them it is flatter than usual. The centrum has somewhat the form of some of those of Doryodon, being broad and of little antero-posterior diameter. The articular faces have a transverse subcordate outline, being flat above. The basal face without keel. The form of the epiphyses indeed approaches subtrigonal.

	In.	Lin.
Length anterior dorsal	2	9
Height articular face	2	8
Width " "	4	
" neural canal	1	9·7
Length median dorsal	3	2·5
Height articular face	3	0·5
Width " "	3	7
" neural canal		14·5

The size of this species is quite comparable to that of the Eschrichtius pusillus, being one of the smaller species. The elevated position of its diapophyses distinguishes it from all the Squalodons.

The extinct species of Balænidæ of the United States are the following:

Megaptera expansa Cope.
Eschrichtius cephalus Cope.
Eschrichtius leptocentrus Cope.
Eschrichtius pusillus Cope.
Balænoptera prisca Leidy.
Balænoptera palæatlantica Leidy.

There is no evidence that either of the two last named species are true Balænopteri. They may be Eschrichtii, but cannot at present be referred to those known as above.

It is to be observed that none of the Miocene species exhibit the dimensions possessed by the largest existing species, while several of them are smaller than the least of those of modern seas. The present period would appear, with present information, to be that in which these monsters have attained their greatest bulk.

The recent Balænidæ of our coasts are the following:

Balæna mysticetus Linn., Polar Sea.
Balæna cisarctica Cope, Temperate Sea.
Balæna cullamach Cham., North Pacific.
Agaphelus glaucus Cope, Temper. Pacific.
Agaphelus gibbosus Erxl., Temp. Atlantic.
Megaptera osphyia Cope, " "
Megaptera longimana Gray, Polar Seas.
Eschrichtius ? robustus Lillj., Temp. Atlantic.
Balænoptera rostrata Fab., North Atlantic.
Sibbaldius laticeps Gray, North Atlantic.

The following notes on these species may be in place here.

Of the Balæna cisarctica there is a skeleton in the Museum of the Academy of an individual of thirty-seven feet, and a ramus mandibuli of sixteen feet in length, indicating a total of sixty-eight feet adult size. A scapula in the Museum Rutger's College, New Brunswick, N. J , measures 36 inches in height, and 48·5 in. in width, indicating an adult of 57 feet in length. A young individual of 45 feet line measurement, awaits mounting in the Museum Compar. Zoology, Cambridge, Mass. Of this individual I will shortly give a detailed description in an essay on the species. Like the other specimens, it presents a strong acromion. The phalanges of the manus exhibited an important difference from those of B. australis. In it they number respectively 2—5—6—3—3, while Cuvier gives (Oss. Foss. 227, 23) 2—5—6—5—4.

The species of Agaphelus are briefly noticed in the present number of the Academy's proceedings. They will be more fully described shortly from material at present in hand.

A second and more full examination of the skeleton of the Megaptera osphyia Cope, furnishes the following additional points and characters. The specimen is young, and measures in its present condition, 34 feet. It has, however, lost a considerable number of caudal vertebræ, and from the posterior part of the column, of intervertebral cartilages also; add to this the shrinking of the cartilages preserved, and the increase of length would perhaps amount to eight feet, giving 42 in all. The asserted length of fifty feet line measurement, which I quoted in my original description, is no doubt an exaggeration.

The glenoid process is margined by an angular prominence, the rudiment of the coracoid, precisely as in the M. brasiliensis. The diapophysis of the atlas is a flat vertical plate, extending from opposite the base of the *foramen dentati* to opposite the widest point of the spinal canal; inferior posterior outline of the atlas broad, slightly concave medially. The mandible is peculiar in the strong angular process, which extends from behind round the side, projecting as far as the condyle, and separated from it by a deep groove. The third and fourth cervicals are united by the neural arch. The first rib is very broad at the extremity; length 37 inches, width at end, 8·22 in. The orbital processes of the frontal bone are not contracted at the extremities as in M. longimana, but are more as in Balænopteræ; entire width over and within edge of orbit, 15½ in.; length to vertical plate of maxillary 31 in. The baleen measures two feet in length, is black, with three rows of coarse bristles. Its base is one curve; its length is spirally twisted.

The species is probably one of the largest of the Balænidæ.

The Eschrichtius robustus is admitted on the evidence of a ramus of the under jaw in the Museum Rutger's College, which is of peculiar form, and closely resembles the figure given by Lilljeborg of that portion of this rare species.

August 4th.

The President, Dr. Hays, in the Chair.

Eighteen members present.

August 11th.

Mr. Cassin, Vice-President, in the Chair.

Twenty members present.